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(54) NEW BODY DEODORANT COMPOSITIONS

(71) We, L'OREAL, a French body Corporate of 14 Rue Royale, 75008 Paris, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to body deodorant compositions as well as to a process for controlling objectionable odours due to bacterial decomposition of perspiration.

Hitherto, in addition to materials which absorb the odours, two main classes of products for combating objectionable odours to human perspiration are known. The first class are products which block or greatly reduce perspiration, such as astringents, notably aluminium salts and especially aluminium hydroxychloride. Such compositions make it possible to prevent the formation of objectionable odours by eliminating their direct cause, namely the emission of perspiration by the epidermis.

The second class of products do not affect, or only slightly affect, the volume of the perspiration but which, by virtue of their bactericidal or antiseptic effect, destroy the bacteria which are responsible for the decomposition of this perspiration. Such products include hexachlorophene, bithionol (bisphenol) and quaternary ammonium compounds such as Cequartyl as well as certain ion exchange resins and metal chelates such as 1,3-diketone chelates.

These two classes of product are not wholly satisfactory because, on the one hand, the astringent or anti-perspirant compositions stop perspiration, which is a natural phenomenon, and furthermore have an unfavourable effect on the epidermis, and, on the other hand, the bactericidal compositions have the disadvantage of completely destroying the microbial flora of the skin and consequently of interfering with the biological equilibrium of the epidermis, which is naturally undesirable.

The present invention is based on the surprising discovery that it is possible to prevent the malodorous decomposition of perspiration by micro-organisms without it being necessary to employ conventional astringent substances or bactericidal substances which completely modify the microbial flora of the skin.

The present invention provides a deodorant composition suitable for body hygiene which comprises together with a cosmeticaly acceptable vehicle, a mixture of (i) at least one weak organic acid and (ii) at least one salt of a weak organic acid with an organic amine, each said weak organic acid, which may be the same or different having the empirical formula $C_nH_m(OH)_x(COOH)_y$, n being 0 or an integer from 1 to 6, m being an integer from 1 to 8, x being 0, 1 or 2 and y being 1, 2 or 3 and a molecular weight not exceeding 192, which mixture, when applied to the skin, maintains the pH of the perspiration at a substantially fixed value of 3 to 6.

We have found that by using such compositions it is possible to forestall, and hence to prevent, the formation of objectionable odours without significantly altering the bacterial flora present on the epidermis. In other words, the compositions of this invention have a selective action on the bacteria which are essentially rseponsible for the bacterial degradation of perspiration leading to the formation of objectionable odours. Consequently, the compositions according to the invention do not significantly interfere with the biological equilibrium of the epidermis, unlike broad-spectrum bactericidal agents such as hexachlorophene which have been used in the past.

We have also found that by using, as the active ingredient, a mixture of a weak organic acid and a salt of a weak organic acid and an organic amine it is possible to obtain excellent cosmetic formulations. In effect, the active ingredient exhibits excellent solubility in the usual cosmetic solvents, which makes it possible to obtain a great variety of formulations without undesirable

phenomena, such as precipitation, taking place.

Suitable weak organic acids which can be used in the compositions of this invention include formic acid, acetic acid, citric acid, malic acid, lactic acid, tartaric acid, adipic acid, phthalic acid, salicyclic acid and succinic acid. It will be appreciated that the weak acid used to prepare the salt need not be the same as the free weak acid used in the composition.

Suitable organic amines which can be used for forming the salts may contain a primary, secondary or tertiary amine group; such amines can be monofunctional or polyfunctional such as aminoalcohols, aminoacids or amine polymers. Heterocyclic compounds are not excluded. Suitable amines include:

aminocalcohols such as 2-amino-2-methyl-1-propanol, 2-amino-2-methyl-1,3-propanediol, monoethanolamine, diethanolamine, triethanolamine, monoisopropanolamine, diisopropanolamine and triisopropanolamine,

aminoacids such as histidine, arginine, lysine and ornithine,

amine polymers such as the cationic polymers resulting from the condensation of piperazine, epichlorohydrin and diglycolamine, and polyoxyethylenated or polyoxypropylenated fatty amines,

or compounds such as ortho-tolylbiguanidine or S-benzylsteamine.

As indicated above, the compositions according to the invention, after having been applied to the skin and after any volatile constituents have evaporated due to body heat, and/or after having become mixed with perspiration, should be capable of maintaining the pH of the latter at a substantially fixed value which is from 3 to 6.

In general, the pH imparted to the perspiration should not exceed the pK of the acid present in the composition or, if it is greater, the pH imparted to the perspiration should be at most 0.8 higher than the pK if the pK of the acid is from 3 to 4.5, at most 0.5 higher if the pK of the acid is from 4.5 to 5 and at most 0.2 higher if the pK of the acid is from 5 to 6.

In general, it has been found that the best rseults can be obtained if the pH imparted to the perspiration has substantially the same value as the pK of the weak acid employed.

The efficiency of the mixture is the greater, the closer to 3 is the pH imparted to the perspiration, From a cosmetic point of view, a pH of 3 constitutes an acceptable limit for good toleration by the mucous membranes of the skin and especially by those of the axially inguinal and interdigital regions.

The deodorant compositions according to the present invention can be in various forms and in particular in the form of aqueous solutions which may contain alcohol, provided, of course, that the mixture which constitutes the active ingredient is soluble in the cosmetic vehicle. The compositions can also consist of a solution of the active ingredient in an organic solvent such as an alcohol, which evaporates rapidly after application of the composition to the epidermis. Preferably, the composition is in the form of an aerosol and is packaged in an aerosol container in the presence of a propellant gas which can be liquefied under pressure, such as trichlorofluoromethane or dichlorodifluoromethane or a mixture thereof. It is also possible to use, as the propellant gas, carbon dioxide or nitrous oxide, either by themselves or mixed with halogenated hydrocarbons such as those listed above.

The alcohols used in the compositions according to the invention are preferably ethanol or isopropanol.

The compositions according to the invention can also be in the form of emulsions of the oil-in-water or water-in-oil type, with the aqueous phase of the emulsion containing the mixture constituting the active ingredient.

Amongst the oils which can be employed to constitute the oily phase of the emulsions there may in particular be mentioned hydrocarbon oils such as paraffin oil, purcellin oil (esters of C_8—C_{18} fatty acids), perhydrosqualene and solutions of micro-crystalline wax in oils; animal or vegetable oils such as sweet almond oil, avocado oil, calophyllum oil, lanoline, castor oil, caballine oil, pork oil, olive oil and sunflower oil; mineral oils having an initial distillation temperature, at atmospheric pressure, of about 250°C., and a final distillation temperature of the order of 410°C.; and saturated esters such as isopropyl palmitate, alkyl (C_3—C_{16}) myristates such as isopropyl myristate, butyl myristate and cetyl myristate, hexadecyl stearate, ethyl palmitate, triglycerides of octanoic and decanoic acids, cetyl ricinoleate and alkyl (C_1—C_{16}) adipates and sebacates. Silicone oils which are soluble in other oils such as dimethylpolysiloxane, methylphenylpolysiloxane and silicone/glycol copolymers can also be used in the oily phase.

The compositions according to the invention can also be in the form of gels or sticks. The sticks may consist of soaps dissolved in ethyl alcohol and polyols, such as glycerol or propylene glycol, into which is incorporated an alcoholic or aqueous-alcoholic solution of the active ingredient. It is, of course, also possible to formulate sticks from waxes, oils, fatty alcohols and conventional emulsifiers, in partciular fatty amides such as copra monoethanolamide and stearic acid diethanolamide.

The various types of composiaion can contain any other ingedient generally used in such types of compositions.

It will, of course, be appreciated that the salt of the weak organic acid with the organic amine can be produced *in situ* in the composition when mixing the various ingredients, or can, if desired, be pepared separately, as, for example, in the case of S-benzylcysteamine malate.

It is clear that the pH conditions specified above should be achieved when the composition has been applied to the epidermis, after evaporation of any volatile additives. Thus, for example, the compositions applied to the skin can, as indicated above, contain a substantial amount of alcohol and have, at the time of application, a pH outside the specified range, provided that after evaporation of the alcohol or other volatile constituents on the epidermis, the perspiration is kept in the pH range from 3 to 6.

The concentation of the mixtue in the composition can vary within rather wide limits. It depends on the solubility of the mixture and also on the method of application because it is clear that it is the concentration of the active ingredient in the perspiration which determines its efficiency, and not the concentration of the active ingredient in the actual composition. Now the concentration of the active ingredient in the perspiration depends, on the one hand, on the amount of composition applied and, on the other hand, on the volume of perspiration emitted during a given time.

In general terms, if the pK of the acid is less than or equal to 5, the concentration of the acid should be at least 10^{-2} M if the pH of the solution is less than the pK or does not exceed the latter by more than 0.2 unit, whilst the concentration of the acid should be at least equal to 0.5×10^{-1} M if the pH exceeds the pK by more than 0.2 unit.

If the pK of the acid is greater than 5, the concentration of the acid should, in general terms, be at least 0.5×10^{-1} M.

In general, the mixture (active ingredient) is present in an amount from 0.5 to 15% by weight based on the total weight of the composition.

The present invention also provides a process for forestalling the formation of objectionable body odours due to the bacterial decomposition of perspiration, which process comprises applying to the axillary, inguinal and/or interdigital regions, a composition according to the invention in an amount sufficient to maintain the pH of the perspiration at a value of 3 to 6, generally for an extended period. Usually, the deodorant effect achieved by the compositions according to the invention can be maintained for at least 24 hours.

The following Examples further illustrate the present invention.

EXAMPLE 1: A deodorant in the form of an alcoholic spray is prepared by mixing the following ingredients:

acetic acid	0.53 g
2 - amino - 2 - methyl - 1,3 - propanediol	0.44 g
perfume	0.5 g
absolute alcohol, q.s.p.	30 g

This composition is then packaged in an aerosol container in the presence of:

trichlorofluoromethane	42 g
dichlorodifluoromethane	28 g

The use of this spray, by application to the armpits, makes it possible, after evaporation, to maintain the pH of the perspiration at 4.9 and to forestoll the formation of objectionable odours.

EXAMPLE 2: An alcoholic deodorant spray is prepared, according to the invention, by mixing the following ingredients:

lactic acid	0.79 g
2 - amino - 2 - methyl - 1 - propanol	0.39 g
perfume	0.5 g
absolute alcohol, q.s.p.	30 g

This composition is then packaged in an aerosol container in the presence of:

trichlorofluoromethane	42 g
dichlorodifluoromethane	28 g

The application of this spray under the armpits makes it possible, after evaporation, to maintain the pH of the perspiration at 4.2 and to prevent bacterial degradation of the perspiration.

EXAMPLE 3: An aqueous-alcoholic deodorant spray is prepared according to the invention, by mixing the following ingredients:

tartaric acid	30 g
monoethanolamine	19.9
perfume	5 g
water	200 ml
ethanol, q.s.p.	1,000 ml
saturation of the solution with nitrous oxide under a pressure of	7 kg/cm².

The use of this spray makes it possible to maintain the pH at 4.3 and to prevent the formation of unpleastant odours for an extended period.

EXAMPLE 4: A deodorant lotion is prepared, according to the invention, by mixing the following ingredients:

citric acid. $1H_2O$	42 g
cationic polymer resulting from the condensation of piperazine, epichlorohydrin and diglycolamine in 28.7% strength aqueous solution (product described in French Patent. No. 74/27,030)	180 ml
ethanol	200 ml
perfume	1 g
water, q.s.p.	1,000 ml

This lotion, applied under the armpits, makes it possible, after evaporation, to maintain the pH at 5.

EXAMPLE 5: An aqueous-alcoholic deodorant spray is prepared according to the invention, by mixing the following ingredients:

malic acid	26.8 g
diethanolamine	30.6 g
water	200 ml
perfume	5 g
ethanol	1,000 ml

The solution is saturated with CO_2 under a pressure of 7 kg/cm².

The use of this spray under the sole of the feet makes it possible, after evaporation, to maintain the pH at 3.9.

EXAMPLE 6: An alcoholic deodorant spray is prepared, according to the invention, by mixing the following ingredients:

succinic acid	1.04 g
triethanolamine	1.76 g
perfume	0.5 g
absolute alcohol, q.s.p.	30 g

This composition is then packaged in an aerosol container in the presence of:

trichlorofluoromethane	42 g
dichlorodifluoromethane	28 g

This spray, applied under the armpits, makes it possible, after evaporation, to maintain the pH at 5.1.

EXAMPLE 7: A deodorant lotion for manual spraying is prepared according to the invention, by mixing the following ingredients:

tartaric acid	30 g
ortho-tolyl-biguanidine	70 g
perfume	5 g
water	350 ml
ethanol, q.s.p.	1,000 ml

after evaporation, to maintain the pH under

The use of this solution makes it possible, the armpits at 4.5.

EXAMPLE 8: A deodorant aqueous-alcoholic spray is prepared, according to the invention, by mixing the following ingredients:

lactic acid	18 g
"Propomeen" (registered Trade Mark) C_{12} [an amine derived from the fatty acids of copra polyoxypropyleneated by means of 2 mols of propylene oxide]	29.8 g
perfume	5 g
water	100 ml
ethanol, q.s.p.	1,000 ml

The solution is saturated with nitrous oxide under a pressure of 7 kg/cm².

After spraying and evaporation, this alcohol spray makes it possible to maintain the pH at 3.75.

EXAMPLE 9: A deodorant lotion for manual spraying is prepared, according to the invention, by mixing the following ingredients:

lactic acid	18 g
arginine	15.5 g
perfume	1 g
water	150 ml
ethanol, q.s.p.	1,000 ml

This solution, applied under the armpits, makes it possible, after evaporation, to maintain the pH of the perspiration at 3.85, and thus avoids the formation of objectionable odours over the 24 hours which follow the application.

EXAMPLE 10: An aqueous - alcoholic spray is prepared, according to the invention, by mixing the following ingredients:

malic acid	13.4 g
S-benzylcysteamine malate ...	19.3 g
perfume	5 g
water	100 ml
ethanol, q.s.p.	1,000 ml

The solution is saturated with nitrous oxide under a pressure of 7 kg/cm².

This spray, when sprayed under the armpits, makes it possible to maintain the pH at 3.4.

EXAMPLE 11: A deodorant emulsion is prepared, according to the invention, by mixing the following ingredients:

lactic acid	2.11 g
2-amino-2-methyl-1-propanol	0.9 g
propylene glycol	23.5 g
stearyl cetyl alcohol polyoxyethyleneated with 15 mols of ethylene oxide	28 g
cetyl alcohol	4.7 g
paraffin oil	11.7 g
isopropyl myristate	4.7 g
water	23.5 g

This emulsion, when applied under the armpits, makes it possible to maintain the pH of the perspiration at 4.0.

EXAMPLE 12: A deodorant lotion is prepared, according to the invention, by mixing the following ingredients:

lactic acid	18 g
L-lysine	14.6 g
ethanol	700 ml
perfume	1 g
water, q.s.p.	1,000 ml

This solution, after manual spraying under the armpits, makes it possible to maintain the pH at 3.9.

EXAMPLE 13: A deodorant lotion is prepared, according to the invention, by mixing the following ingredients:

acetic acid	12 g
L-ornithine	13.2 g
ethanol	800 ml
perfume	1 g
water, q.s.p.	1,000 ml

This solution, after manual spraying under the armpits, makes it possible to maintain the pH at 5.1.

EXAMPLE 14: A deodorant lotion is prepared, according to the invention, by mixing the following ingredients:

orthophthalic acid	33.2 g
L-histidine	48.4 g
water	500 ml
perfume	1 g
ethanol, q.s.p.	1,000 ml

This solution, after manual spraying under the armpits, makes it possible to maintain the pH at 4.8.

EXAMPLE 15: In accordance with the present invention, a deodorant lotion for manual spraying is prepared by mixing the following components:

lactic acid	9 g
S-benzyl cysteamine malate	19.3 g
perfume	1 g
water	100 ml
ethanol, q.s.p.	1,000 ml

This lotion when sprayed to the underarm area and after evaporation of the volatile portion therof maintains the pH of the perspiration at 3.4, thus avoiding the formation of unpleasant odours.

EXAMPLE 16: In accordance with the present invention deodorant lotion for manual spraying is prepared by mixing the following components:

o-phthalic acid	16.6 g
arginine lactate	26.2 g
perfume	1 g
water	150 ml
ethanol, q.s.p.	1,000 ml

This lotion when sprayed to the underarm area and after evaporation of the volatile fraction thereof maintains the pH of the perspiration at 3.2.

EXAMPLE 17: In accordance with the present invention a deodorant gel is prepared by mixing the following components:

succinic acid	23.6 g
monoethanolamine	6.1 g
hydroxy ethyl cellulose	45 g
water, q.s.p.	1,000 ml

This gel when applied to the underarm area maintains the pH of the perspiration at 4.6, thus avoiding the formation of unpleasant odours for 24 hours following the application.

WHAT WE CLAIM IS:—

1. A deodorant composition suitable for application to the human body which comprises, together with a cosmetically acceptable vehicle, a mixture of (i) at least one weak organic acid and (ii) at least one salt of a weak organic acid with an organic amine, each said weak organic acid, which may be the same or diffeent, having the empirical formula $C_nH_m(OH)_x(COOH)_y$, n being 0 or an integer from 1 to 6, m being an integer from 1 to 8, x being 0, 1 or 2 and y being 1, 2 or 3, and a molecular weight not exceeding 192, the acid and salt being present in an amount such that the composition is capable of producing a pH of 3 to 6 in perspiration on the skin.

2. A composition according to claim 1 in which the acid is formic acid, acetic acid, citric acid, malic acid, lactic acid, tartaric acid, adipic acid, phthalic acid, salicyclic acid or succinic acid.

3. A composition according to claim 1 or 2 in which the organic amine is a monofunctional or polyfunctional compound hav-

ing a primary, secondary or tertiary amino group.

4. A composition according to any one of the preceding claims, in which the organic amine is an aminoalcohol which is 2-amino-2 - methyl - 1 - propanol, 2 - amino - 2-methyl-1,3-propanediol, monoethanolamine, diethanolamine, triethanolamine, monoisopropanolamine, diisopropanolamine or triisopropanolamine.

5. A composition according to any one of claims 1 to 3, in which the organic amine is an amino-acid which is histidine, arginine, lysine or ornithine.

6. A composition according to any one of claims 1 to 3, in which the organic amine is a cationic polymer resulting from the condensation of piperazine, epichlorohydrin and diglycolamine or is a polyoxyethylenated or polyoxypropylenated fatty amine.

7. A composition according to any one of claims 1 to 3, in which the organic amine is *ortho*-tolyl-biguanidine or S-benzylcysteamine.

8. A composition according to any one of the preceding claims, in which the pH imparted to the perspiration on the skin is substantially equal to the pK of the weak organic acid of component (i).

9. A composition according to any one of the preceding claims, in which the mixture is present in an amount from 0.5 to 15% by weight based on the total weight of the composition.

10. A composition according to any one of the preceding claims, in which the vehicle is an aqueous or aqueous-alcoholic solution or an organic solvent.

11. A composition according to claim 10 in which the organic solvent is an alcohol.

12. A composition according to any one of the preceding claims, in which the vehicle comprises a mixture of an alcohol and a propellant gas liquefied under pressure, the composition being packaged in an aerosol container.

13. A composition according to claim 11 or 12 in which the alcohol is ethanol or isopropanol.

14. A composition according to any one of claims 1 to 10 which is in the form of an oil-in-water or water-in-oil emulsion, the aqueous phase of the emulsion containing the said mixture.

15. A composition according to any one of claims 1 to 10, which is in the form of a gel or stick.

16. A composition according to claim 1 substantially as hereinbefore described.

17. A composition according to claim 1 substantially as described in any one of the Examples 1 to 14.

18. Process for forestalling the formation of body odour which comprises applying to the axillary, inguinal and/or interdigital regions of the body a composition as claimed in any one of the preceding claims in an amount sufficient to maintain the pH of body perspiration at a value from 3 to 6.

19. Process according to claim 18 in which the composition is applied so as to maintain the pH from 3 to 6 for a period of at least 24 hours.

20. Process according to claim 18 substantially as hereinbefore described.

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